

**Bonneville Power Administration
Fish and Wildlife Program FY99 Proposal Form**

Section 1. General administrative information

Yakima Phase 2 Screen Fabrication

Bonneville project number, if an ongoing project 9105700

Business name of agency, institution or organization requesting funding

Washington Dept. of Fish & Wildlife, Yakima Screen Shop

Business acronym (if appropriate) WDFW, YSS

Proposal contact person or principal investigator:

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Subcontractors.

Organization	Mailing Address	City, ST Zip	Contact Name
U.S. Bureau of Reclamation (UCAO)	1917 Marsh Rd.	Yakima, WA 98907-1749	J. Brooks Brown, Contracts Specialist

NPPC Program Measure Number(s) which this project addresses.

7.11B.1

NMFS Biological Opinion Number(s) which this project addresses.

Other planning document references.

Yakama Indian Nation, WDFW=s anadromous fish co-manager, has been a supporting partner in this project from its inception in 1990 and initial funding in FY1992.

Subbasin.

Yakima

Short description.

YSS fabricates and installs fish screens and all miscellaneous metalwork for Yakima Basin Phase II screen projects. New fish screens prevent loss of juvenile anadromous and resident fish in gravity irrigation diversions.

Section 2. Key words

Mark	Programmatic Categories	Mark	Activities	Mark	Project Types
<u> X </u>	Anadromous fish	<u> X </u>	Construction	<u> X </u>	Watershed
<u> </u>	Resident fish	<u> </u>	O & M	<u> </u>	Biodiversity/genetics
<u> </u>	Wildlife	<u> </u>	Production	<u> </u>	Population dynamics
<u> </u>	Oceans/estuaries	<u> </u>	Research	<u> </u>	Ecosystems
<u> </u>	Climate	<u> </u>	Monitoring/eval.	<u> </u>	Flow/survival
<u> </u>	Other	<u> </u>	Resource mgmt	<u> </u>	Fish disease
		<u> </u>	Planning/admin.	<u> </u>	Supplementation
		<u> </u>	Enforcement	<u> </u>	Wildlife habitat en-
		<u> </u>	Acquisitions		hancement/restoration

Other keywords.

Section 3. Relationships to other Bonneville projects

Project #	Project title/description	Nature of relationship
9107500	Yakima Phase II Screens - Construction (USBOR)	mandatory linkage with screen facility civil works construction
9200900	Yakima Screens - Phase II - O&M (WDFW, YSS)	operation & preventative maintenance of completed screens
8506200	Passage Improvement Evaluation (PNNL)	biological and hydraulic evaluation of selected Phase II screens

Section 4. Objectives, tasks and schedules

Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
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1	Fabricate Phase 2, Group 7 fish screens and miscell. metalwork at Yakima Screen Shop	a	fabricate screens and misc. metalwork for sites designated by the Passage Tech. Work Group
		b	Install and field test screens in completed civil works structures

Objective schedules and costs

Objective #	Start Date mm/yyyy	End Date mm/yyyy	Cost %
1	02/1999	02/2000	100.0

Schedule constraints.

Delays in screen civil works construction caused by diversion water rights uncertainty (court adjudication), engineering design bottlenecks, property acquisition delays or funding constraints affects the Yakima Screen Shop fabrication schedule. Civil works delays usually result in deferred screen fabrication and unspent funds during a budget cycle.

Completion date.

FY2002

Section 5. Budget

FY99 budget by line item

Item	Note	FY99
Personnel	fabrication/installation labor costs	62,500
Fringe benefits	@ 31% of labor costs	18,700
Supplies, materials, non-expendable property	includes WA sales tax @ 7.8%	62,600
Capital acquisitions (major equipment)	None in FY99	0
Travel (vehicle mileage)	screen installation/field testing	1,500

Indirect costs (local)	YSS indirect costs @ \$300/man-month	7,800
Subcontracts	BOR sandblast & painting contract	3,200
Subtotal	items applicable to administrative O/H	156,300
Agency O/H	admin. overhead @ 19% of subtotal	29,700
TOTAL		\$186,000

Outyear costs

Outyear costs	FY2000	FY01	FY02	FY03
Total budget	300,000	150,000	100,000	0
O&M as % of total	0	0	0	0

Section 6. Abstract

Obsolete fish screens from the 1930's, 40's, 50's and 60's must be replaced or updated to comply with current, regional fish screen biological protection criteria adopted by CBFWA's Fish Screening Oversight Comm. (FSOC) in 1995. The project objective is to provide protection approaching 100% for all species and life stages of anadromous (and resident) salmonids. Old screens in the Yakima basin, and in other Columbia R. subbasins, may provide fair protection for large (4-6 inch long) yearling smolts, but poor protection for fry and fingerling life stages.

Mortality of fry and fingerlings by irrigation diversions may reduce subsequent smolt production and inhibits efforts to restore depressed salmon and steelhead populations through natural production or hatchery supplementation. Biological evaluation of completed Phase 2 fish screen facilities by PNNL under Project# 8506200 has quantified survival and guidance rates approaching 100% (range: 90-99%). Consequently, the state and federal fish agencies and Yakama Indian Nation propose to complete replacement or upgrade of all obsolete fish screen facilities in the Yakima Basin by the end of FY 2002.

Section 7. Project description

a. Technical and/or scientific background.

Survival and fish bypass effectiveness at Yakima Basin fish screens constructed in the 1930's, 40's, 50's, 60's and even as recently as the 1970's, are inadequate to assure that gravity water diversions are not depressing anadromous salmonid egg-to-smolt survival rates. Survival and bypass guidance at Pacific Corps. Wapatox Canal hydropower/irrigation diversion on the Naches R. were quantified by Eddy (1988). This pre-Phase 2 facility (500 cfs, circa 1936) was studied in 1986 and 1987 and shown to guide less than 10 percent (0-7%) of marked, acclimated, hatchery-reared chinook fry (<60 mm FL) safely back to the river. Fingerling (60-90 mm) and yearling smolt size chinook (>90 mm) experienced incrementally better guidance that was clearly size related; 40-60 percent for fingerlings and 70-75 percent for yearlings. Low survival/guidance for small fish was attributed to canal

entrainment caused by over-sized screen mesh openings and screen impingement caused by high approach velocity at the screen face, perpendicular screen orientation relative to canal flow, and poor hydraulic conditions at the fish bypass entrances. This electric-drive, drum screen facility, with an average approach velocity of 1.0 feet/sec (range: 0.8 -1.4 feet/sec) and 1/4" screen mesh openings, was designed primarily to protect larger, yearling size fish. These obsolete design criteria are representative of most pre-Phase 2 fish screens in the Yakima Basin and throughout WA. Some paddlewheel-driven drum screens were designed based on a 1.5 feet/sec approach velocity, thought to be necessary to provide adequate power to turn the paddlewheel, with total disregard for the biological needs of the fish.

At about the same time, the Wash. Dept. of Fisheries (WDF) , Dept. of Wildlife and Centralia City Light Dept. contracted with the Univ. of Wash., Fisheries Research Institute to perform laboratory swimming stamina tests of several salmon species including steelhead and resident rainbow trout (Smith and Carpenter, 1987). The research revealed that a design screen approach velocity of 0.4 feet/sec was necessary to protect emergent fry of the weakest species (steelhead, rainbow trout, pink & chum salmon) at low spring- time water temperatures (3-4° C.). WDF adopted the 0.4 feet/sec approach velocity criteria in 1988. Oregon Dept. of Fish and Wildlife and NMFS concurred with the findings and also adopted this conservative criteria.

In 1992, WDF conducted research on salmon fry entrainment through various types and sizes of screen material (Bates and Fuller, 1992). The results showed that that mesh openings greater than 0.125 inches allowed entrainment of salmon emergent fry. A similar study performed by Beecher and Engman (1995) testing steelhead and resident rainbow trout fry determined that a 3/32 inch (0.094) criteria was necessary to prevent entrainment. This conclusion was supported by an evaluation of the Dryden Canal fish screen (Wenatchee R.) in 1994 by the Pacific Northwest National Laboratory (Mueller et al. 1995). Although the Dryden screen was designed using the 0.4 feet/sec approach velocity criteria, it was constructed in 1993 using the applicable 0.125 inch mesh opening criteria. PNNL determined that 6 percent of wild summer chinook fry were entrained and in excess of 40 percent of rainbow trout were entrained.

Together these studies represent the scientific basis for the current regional fish screening criteria adopted in 1995 by NMFS and the WA, OR and ID fish screening programs (the principal regulatory agencies on the Columbia Basin Fish & Wildlife Authority=s Fish Screening Oversight Comm.). Evaluations conducted under Proj# 8506200 by PNNL confirm that Yakima Phase 2 fish screens constructed to the current criteria and properly operated and maintained, protect fry from injury/mortality and achieve bypass guidance rates in the 90-99 percent range. Fish screen facilities with this high level of protection performance minimize a source of mortality that can reduce basin smolt production.

b. Proposal objectives.

YSS will fabricate and install screens and miscellaneous metalwork for the following new Phase 2 diversions projected to be constructed in FY99:

1) Selah-Moxee I.D. Canal (90 cfs, Yakima R.)

2) Hubbard Ditch (30 cfs, Yakima R.)

3) Moxee Ditch (15 cfs, Yakima R.)

c. Rationale and significance to Regional Programs.

The NPPC and BPA have made substantial investments in Yakima Basin anadromous fish recovery. These investments are considered Aoff-site≡ mitigation for habitat losses elsewhere in the Columbia River and are predicated on the fact that substantial wild salmon production potential still exists because large amounts of accessible, high quality spawning and rearing habitat still exists in parts of the basin. The Yakima/Klickitat Fisheries Project (YKFP) experimental supplementation facilities are the latest major investment of the FWP. The objective of the YKFP is to supplement and enhance recovery of naturally-produced salmon and steelhead. Improved juvenile fish survival at Yakima Basin gravity water diversions is widely believed to be important in improving overall egg-to-smolt survival of critically depressed stocks of naturally-produced spring chinook, fall chinook and steelhead. This also applies to the progeny of future returning adult YKFP supplementation fish that will naturally reproduce on the spawning grounds.

Completion of the Phase 2 fish screen construction program, and on-going preventative screen maintenance addressed by Proj.# 9200900, are complementary Ainfrastructure≡ investments intended to safeguard and enhance the other FWP anadromous fish recovery investments in the basin.

d. Project history

Since FY92, YSS has completed shop fabrication, delivery and field installation of fish screens, fish bypass control systems, lifting gantries and other miscellaneous metalwork or conversion/decommissioning for 32 of the 66 prioritized Yakima Basin Phase 2 water diversions approved in program measure 7.11B.1. This project is ongoing with two new facilities being fabricated and scheduled for completion prior to the 1998 irrigation season. Total YSS costs for Yakima Basin Phase 2 screen fabrication through FY98 is \$2,266,777 (after deducting BPA funds provided to YSS under this project number for fabricating Umatilla River screens and for portable drum screens for Oregon and Idaho).

e. Methods.

Project priority and scheduling is determined by the Yakima Basin Passage TWG.

Once the annual work plan is developed with specific projects selected for construction, screens and miscellaneous metalwork will be fabricated by YSS using state-of-the-art methods and materials.

f. Facilities and equipment.

WDFW's Yakima Screen Shop is a fully-equipped and staffed metal fabrication shop with the capability to build nearly anything out of mild steel, stainless steel or aluminum. The acquisition of high-production fabrication equipment with previous BPA and state funding and the hiring of highly skilled metal fabricators has allowed the mission of the YSS to expand from primarily operation and maintenance (O&M) of existing fish screens (prior to 1985) to include "production-level" fabrication of new rotating drum, traveling belt and flat plat fish screens. In addition to adequate shop space and equipment, the program has a new 12-1/2 ton boom truck, a back-hoe, 10 yd. dump truck, a BPA-purchased 1-1/2 ton flatbed truck, assorted trailers and other equipment necessary for field construction and installation of screens and miscellaneous metalwork.

g. References.

Bates, K. and R. Fuller. 1992. Salmon fry screen mesh study. Wa. Dept. of Fisheries report, Olympia, Washington.

Beecher, H. and G. Engman. 1995. Screen mesh size effectiveness for excluding trout fry from water diversions. Wa. Dept. of Fish & Wildlife report, Olympia, Washington.

Eddy, B.R. 1988. Wapatox Canal fish screen facility passage effectiveness evaluation: 1986-87. Pacific Power & Light Co. report, Portland, Oregon.

Mueller, R.P., C.S. Abernethy and D.A. Neitzel. 1995. A fisheries evaluation of the Dryden fish screening facility. Annual Report 1994. DOE/BP-00029-2, Bonneville Power Administration, Portland, Oregon

Smith, L.S. and L.T. Carpenter. 1987. Salmonid fry swimming stamina data for diversion screen criteria. Fisheries Research Institute, University of Washington, Seattle, Washington.

Section 8. Relationships to other projects

This is not intended to duplicate the Relationships table in Section 3. Instead, it allows for more detailed descriptions of relationships, includes non-interdependent relationships, and includes those not limited to specific Bonneville projects.

Project accomplishments and annual expenditures are inextricably linked to progress on Proj.# 9107500, Yakima Phase 2 screen civil works construction

managed by the Bureau of Reclamation (BOR). YSS tries to match the shop fabrication schedule to the BOR civil works construction schedule, delaying fabrication if necessary to prevent cost overruns that could result from civil works design changes. Cost-effective and timely completion of Phase 2 screen projects requires that both this project (9105700) and 9107500 be adequately funded and coordinated. Coordination is accomplished through the Yakima Passage Technical Work Group (TWG).

Completed projects are periodically evaluated by fishery scientists from the Pacific Northwest Labs (PNNL) under Project# 8506200. Independent evaluation, both hydraulic and biological, by an independent third party not directly involved in screen construction or O&M, provides valuable Adaptive management feedback used by YSS, BOR and the Passage TWG to improve screen fabrication and O&M procedures with the objective of providing optimum protection of juvenile salmonids at gravity water diversions.

In 1999, the BPA-funded Yakima/Klickitat Fisheries Project (YKFP) hatchery supplementation program (Proj.# 9701300) will begin releasing experimental and control groups of spring chinook salmon smolts from acclimation/release ponds. YKFP experiments and fish production will benefit from completion of pending Phase 2 screen projects by reducing injury, delay and mortality of hatchery smolts at Yakima Basin irrigation diversions.

Similar fish screen construction projects are ongoing in Oregon (Proj.# 9306600) and Idaho (Proj.# 9401500) subbasins. Taken together, regional efforts to improve juvenile anadromous salmonid survival at water diversions may result in higher Columbia basin natural smolt survival and outmigration and contribute to Columbia River salmon and steelhead stock recovery.

Section 9. Key personnel

John A. Easterbrooks, WDFW Fish Screening Program Manager/Fish Biologist
3 man-weeks/yr

Duties: Yakima Basin Passage TWG coordination, planning; project oversight (shop and field) from a biological perspective; annual project proposal and outyear budgeting.

Resume: John Easterbrooks has been the manager of the WDFW Fish Screening Program since 1983. The program designs, fabricates (metalwork), constructs (civil works), modifies, inspects, operates and maintains fish passage and protection facilities at surface water diversionsXprimarily in anadromous fish areas of the Columbia Basin. Mr. Easterbrooks has expertise in the design, operation, maintenance and hydraulic/biological evaluation of all types of fish passage/protection facilities. Mr. Easterbrooks has provided project oversight for BPA-funded, YSS screen fabrication beginning in 1984 with the Yakima Phase 1 fish

passage construction program and continuing with Yakima Phase 2 in 1992. Mr. Easterbrooks represents WDFW on the Yakima Basin Passage Technical Work Group (Passage TWG) and CBFWA=s regional Fish Screening Oversight Committee (FSOC). Both groups are charged with implementing fish passage/screening construction programs critical to restoration of Columbia River salmon and steelhead. Mr. Easterbrooks holds a B.S. degree in Wildlife Management from the Univ. of Maine (1974), and an M.S. degree in Fishery Resources from the Univ. of Idaho (1981).

Patrick C. Schille, Construction & Maintenance Superintendent

7 man-weeks/yr

Duties: Project estimator and detailed budget preparation, project cost tracking, design review, fabrication quality control.

Resume: Pat Schille has 10 years of combined experience as a fish screen fabricator and supervisor at the YSS. Mr. Schille was the first welder/fabricator hired specifically to work on BPA-funded screen projects in 1987 (Yakima Phase 1). Pat has 20 years of fabrication experience and 8 years in a supervisory capacity. Technical training includes: fabrication layout, advanced welding, blueprint reading, applied hydraulics, personnel management, project estimation and management, basic personal computer training (wordprocessor and spreadsheet).

Chuck Lenberg, Plant Mechanic Supervisor

41 man-weeks/yr

Duties: Shop foreman supervising project welder/fabricators, general repairers and laborers; review of shop fabrication drawings; materials and tool procurement; task coordination and scheduling; product quality control; field supervision during screen installation.

Resume: Chuck Lenberg is a journeyman welder/fabricator with 15 years of shop and field experience in production metal fabrication and 6 years of supervisory experience as a shop foreman including 8 years of service with the YSS. Technical training includes: fabrication layout, advanced welding, blueprint reading, automotive repair, heavy equipment operation and basic computer training (wordprocessor and spreadsheet).

Robert Haverfield, Lead Welder/Fabricator

40 man-weeks/yr

Duties: Fish screen and miscellaneous metalwork layout and fabrication; shop equipment maintenance and repair, heavy equipment operation in the field (boom truck, backhoe, dump trucks, etc.); field installation of fish screens and misc. metalwork; supervision of temporary laborer.

Resume: Bob Haverfield is a journeyman welder/fabricator with 13 years of shop and field experience in production metal fabrication and 5 years of supervisory experience as a foreman including 4 years of service with the YSS. Technical training includes: fabrication layout, advanced welding, blueprint reading, entry level management and heavy equipment operation. Bob holds a Class A

Commercial Drivers License (CDL) necessary for heavy equipment operation on the road.

Scott Brons, Welder/Fabricator/Machinist; Draftsman

40 man-weeks/yr

Duties: Fish screen and miscellaneous metalwork layout and fabrication; lathe and milling machine operation; preparation of shop fabrication drawings (manual and computer-assisted); shop equipment maintenance and repair, heavy equipment operation in the field (boom truck, backhoe, dump trucks, etc.); field installation of fish screens and misc. metalwork; supervision of temporary laborer.

Resume: Scott Brons is a journeyman welder/fabricator with 10 years of shop and field experience in production metal fabrication and machining including 5 years of service at the YSS. Technical training includes: fabrication layout, advanced welding, blueprint reading, heavy equipment operation, and drafting including computer-assisted drawing using AutoCad. Scott holds a Class A Commercial Drivers License (CDL) necessary for heavy equipment operation on the road.

Section 10. Information/technology transfer

YSS is constantly looking for ways to enhance screen quality, durability and fish protection effectiveness. Particularly improvements in: 1) rotating drum and traveling belt screen seals and drive systems, and 2) active cleaning systems for fixed plate screens. Innovations are shared with BOR, NMFS and the other state screening programs (OR, ID) by providing shop sketches and/or revised engineering drawings on request. New developments are also shared between the state screening program coordinators at Fish Screening Oversight Committee (FSOC) meetings (FSOC is a standing CBFWA committee). In addition, improved fish screening technology is shared among the hands-on fabrication and O&M personnel of the state and federal agencies and tribes at the Pacific Northwest Fish Screening Fabrication, Operation & Maintenance Workshop held annually since 1992. This workshop is co-sponsored by BPA & CBFWA (FSOC) and hosted by the three state screening programs on a revolving basis.